

**Citation:**

Sioen I, De Henauw S, Verbeke W, Verdonck F, Willems JL, Van Camp J. Fish consumption is a safe solution to increase the intake of long-chain n-3 fatty acids. *Public Health Nutr.* 2008 Nov;11(11):1107-16.

**PubMed ID:** [18167167](#)

**Study Design:**

Quantitative Assessment / Meta-Analysis

**Class:**

M - [Click here](#) for explanation of classification scheme.

**Research Design and Implementation Rating:**

NEUTRAL: See Research Design and Implementation Criteria Checklist below.

**Research Purpose:**

- To evaluate if the recommendation for long chain n-3 PUFA can be obtained by fish consumption without exceeding the provisional tolerable weekly intake (PTWI) of MeHg and the tolerable weekly intake (TWI) of dioxin like compounds.
- To analyze the health risk of consuming the recommended amount of fish based on the Belgian standards.

**Inclusion Criteria:**

- Used the data from the Pan-European SEAFOODplus consumer survey, analyzed the seven most consumed fish.
- Contaminant data was taken from 2 new databases which contained published data on nutrient and contaminant concentrations for various fish for Belgian.

**Exclusion Criteria:**

None reported.

**Description of Study Protocol:****Recruitment**

This was a hypothetical scenario. A hypothetical population was used including a sample of 600 individuals (n=300 men n= 300 women). Each group was evenly distributed into four age classes (30-39 years, 40-49 years, 50-59 years, 60-69 years). Normal gender, age and body weight distributions were used and based on the Belgian population (BIRNHI study). It was believed by the investigators that N=600 was sufficient for to allow for good convergence of the intake results (data not reported).

**Design:** Quantitative assessment / meta-analysis

A simulation model that combined species-specific fish consumption patterns with nutrient and contaminant concentration data was used to intake assessment.

**Blinding used (if applicable)** not applicable

**Intervention (if applicable)** not applicable

**Statistical Analysis**

- Means and distribution data provided.
- Hypothetical groups were established to include three consumption patterns and three sub-scenarios for each consumption patterns including the frequency of consuming fish per week (1x, 2x or 3x/ week).
- Average daily intake of an individual per kg of body weight was calculated using consumption and contaminant concentration data.

**Data Collection Summary:****Timing of Measurements**

Hypothetical groups were established to include three consumption patterns and three sub-scenarios for each consumption patterns including the frequency of consuming fish per week (1x, 2x or 3x/ week).

Flow for scheme for the study analysis-

Pan-European SEAFOODplus consumer survey selected 7 most consumed fish Evaluated for three consumption scenarios (observed consumption patterns, altered pattern 50% lean and 50% fatty fish, altered pattern 100% fatty fish) Three sub scenarios for each scenario (1x, or 2x or 3x a portion of 150g fish per week) probabilistic intake assessment of nutrients and contaminants re-analysis with addition of daily portion of long chain n-3 enriched margarine.

**Dependent Variables**

- Contaminants- MeHg (in ng/g fish); dioxin-like PCB (dlPCB expressed in pg WHO-TEQ/g fish; dioxins plus furans (PCDD/F); total dioxin-like compounds referred to as total TEQ (totTEQ)

**Independent Variables**

- Fish consumption of 7 types of fish: Cod, Tuna, Alaska pollock, Plaice, Atlantic salmon, Herring, Mackerel; and Total lean fish and Total fatty fish
- Nutrients: EPA+DHA was considered as one nutrient, long chain n-3 PUFA

**Control Variables**

Investigators attempted to control for age and gender by developing a hypothetical population equal for gender and divided into four different age classes.

**Description of Actual Data Sample:**

**Initial N:** 600 (300 males, 300 females)

**Attrition (final N):** not applicable, as above

**Age:** age classes 30-39 years; 40-49 years; 50-59 years; 60-69 years

**Other relevant demographics:** none

### **Anthropometrics**

Normal body weight distributions were used per gender and age interval. This was based on the available data from the Belgian population (BIRNH study).

### **Weight (kg±SD)**

#### **Men Women**

30-39 years 77.2±11.2 62.7±10.9

40-49 years 78.9±11.5 66.7±11.7

50-59 years 77.4±11.4 69.5±11.2

60-69 years 75.3±12.3 69.5±11.9

### **Location:**

Belgium- hypothetical location

## **Summary of Results:**

### **Key Findings:**

- The Belgian recommendation for EPA + DHA (0.3% of total energy intake) can be reached by consuming fatty fish a minimum of twice a week, or by varying between lean and fatty fish a minimum of three times a week
- At this fish consumption level, MeHg intake is not an issue of toxicological concern.
- Increased fatty fish consumption would reduce the intake of MeHg.
- totTEQ increases when lean fish consumption is replaced by fatty fish sources.
- Increased consumption of fatty fish increases the intake of EPA+DHA
- Some fish including Cod and Pollock contain a high EPA+DHA to totTEQ ratio. But due to its low EPA+DHA absolute concentration it would be difficult to obtain the dietary recommendations.
- The results indicated that the consumption pattern of 50% lean fish and 50% fatty fish consumed a minimum of 3 x week or only fatty fish consumed 2x times a week would achieve adequate consumption of EPA+DHA 48% of the population for 3x week 50/50 and 92.5% of the population for 2x week for fatty fish consumption only.
- None of the scenarios would cause an MeHg intake that would cause a health concern.
- Consuming enriched margarine would increase the EPA+DHA mean daily intake to 159 mg, or 23.3% of the Belgian recommendation.

## Author Conclusion:

The Belgian recommendation for EPA+DHA can be obtained by regular consumption of fish especially if consuming lean and fatty fish 50% each a minimum of three times per week or fatty fish a minimum of two times per week. However, consuming fatty fish three times a week leads to an intake of totTEQ of potential toxicological concern. Therefore other food sources for consuming EPA+DHA should be considered. Clear dietary advice about the consumption of fish and ways to increase the intake of LC n-3 PUFA without increasing the toxicological concerns needs to be considered.

## Reviewer Comments:

*The investigators provided sound hypothetical schematic for evaluating the relationship of fish consumption and health and toxicological risks. Article inclusion/exclusion criteria not described.*

## Research Design and Implementation Criteria Checklist: Review Articles

### Relevance Questions

1.	Will the answer if true, have a direct bearing on the health of patients?	Yes
2.	Is the outcome or topic something that patients/clients/population groups would care about?	Yes
3.	Is the problem addressed in the review one that is relevant to nutrition or dietetics practice?	Yes
4.	Will the information, if true, require a change in practice?	Yes

### Validity Questions

1.	Was the question for the review clearly focused and appropriate?	Yes
2.	Was the search strategy used to locate relevant studies comprehensive? Were the databases searched and the search terms used described?	No
3.	Were explicit methods used to select studies to include in the review? Were inclusion/exclusion criteria specified and appropriate? Were selection methods unbiased?	No
4.	Was there an appraisal of the quality and validity of studies included in the review? Were appraisal methods specified, appropriate, and reproducible?	No
5.	Were specific treatments/interventions/exposures described? Were treatments similar enough to be combined?	Yes
6.	Was the outcome of interest clearly indicated? Were other potential harms and benefits considered?	Yes

7.	Were processes for data abstraction, synthesis, and analysis described? Were they applied consistently across studies and groups? Was there appropriate use of qualitative and/or quantitative synthesis? Was variation in findings among studies analyzed? Were heterogeneity issues considered? If data from studies were aggregated for meta-analysis, was the procedure described?	No
8.	Are the results clearly presented in narrative and/or quantitative terms? If summary statistics are used, are levels of significance and/or confidence intervals included?	Yes
9.	Are conclusions supported by results with biases and limitations taken into consideration? Are limitations of the review identified and discussed?	Yes
10.	Was bias due to the review's funding or sponsorship unlikely?	Yes

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